STOCKPILE REPORT
to the Congress

JULY - DECEMBER 1956

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF DEFENSE MOBILIZATION
WASHINGTON 25, D. C.

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OFFICE OF THE DIRECTOR

March, 1957

The Honorable
The President of the Senate

The Honorable
The Speaker of the House of Representatives

Sirs:

There is presented herewith the semi-annual Report to the Congress on the Stockpiling Program in accordance with Section 4 of the Strategic and Critical Materials Stock Piling Act, Public Law 520, 79th Congress. This report covers the period from July 1 to December 31, 1956.

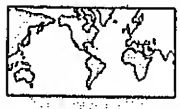
Sincerely yours,

Gordon Gray

Gordon Gray
Director

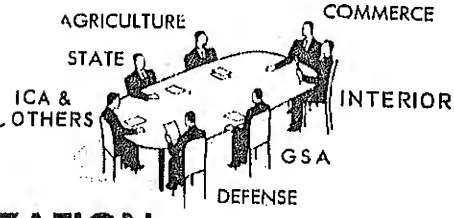
STOCKPILING

$11,000,000,000



STRATEGIC FACTORS

SUPPLY-DEMAND DATA PROGRAM



OFFICE OF DEFENSE MOBILIZATION

1. Establishes Defense Materials Policies and Programs
2. Determines Stockpile Materials
3. Sets Stockpile Objectives
4. Determines Purchase Programs

OPERATIONS

GENERAL SERVICES ADMINISTRATION

EMERGENCY PROCUREMENT SERVICE

BUYS OR ACQUIRES AND STORES STOCKPILE MATERIALS FROM:

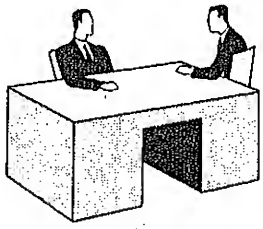
GOVERNMENT SOURCES

SUCH AS:

DEFENSE PRODUCTION ACT INVENTORIES

GOVERNMENT OWNED SURPLUSES

COMMODITY CREDIT CORPORATION
BARTER FOR AGRICULTURAL SURPLUSES



U. S. PRODUCERS AND IMPORTERS

INVENTORIES

OBJECTIVES	$11.0 Billion, including $6.6 Billion minimum	ON HAND $6,500,000,000	24,500,000 Tons

12/31/56

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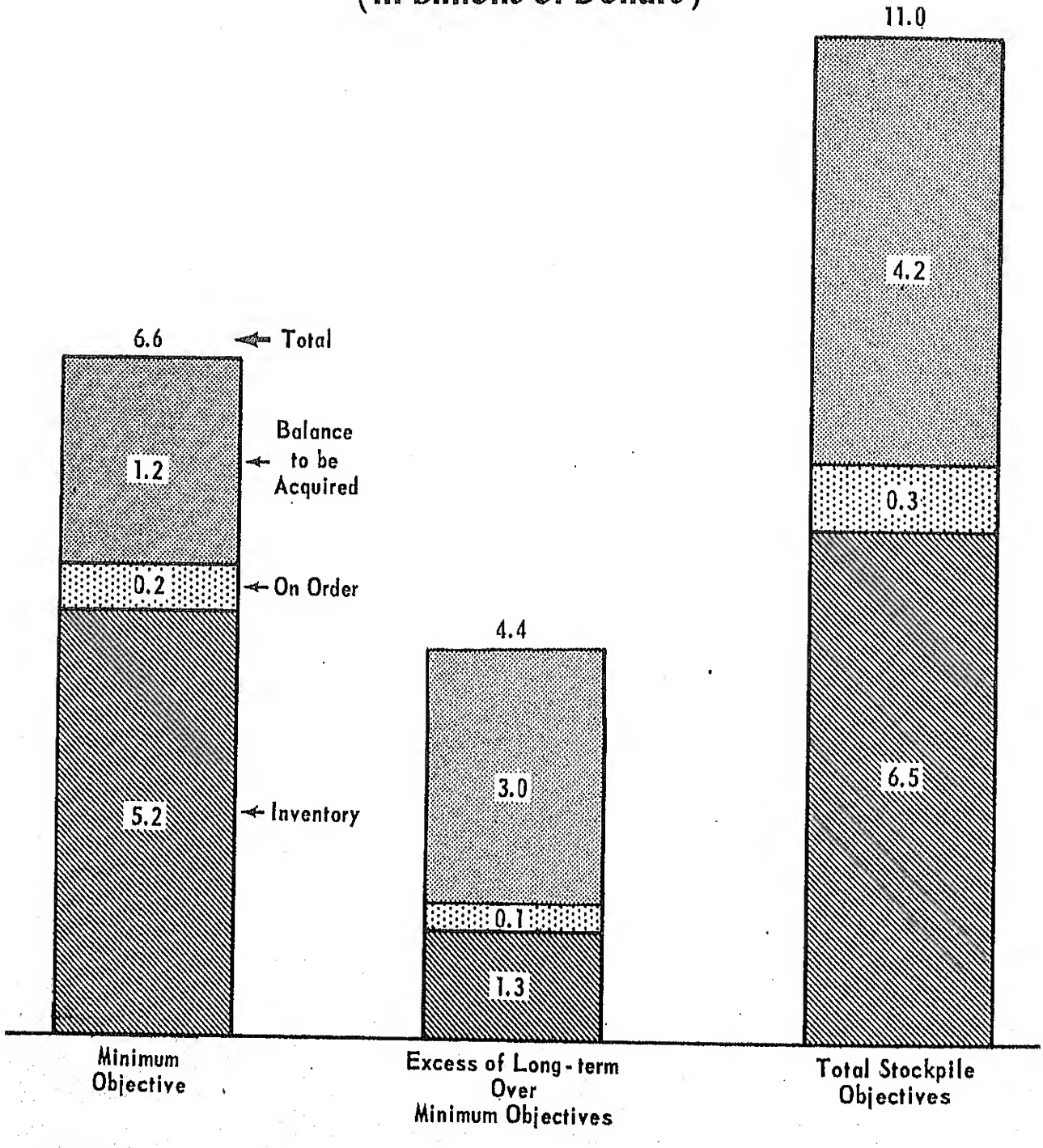
Chart I

STOCKPILE STATUS

(In Billions of Dollars)



Notes:

Takes account only of materials on hand or on order under Stock Piling Act.

Levels of objectives and values based on market prices as of December 31, 1956

SUMMARY

This report covers stockpile operations from July 1 to December 31, 1956, and discusses significant research and development activities for stockpile materials undertaken since the passage of the Stock Piling Act in 1946.

About 24,500,000 tons of stockpile materials having a value of $6.5 billion based on December 31, 1956; prices were stored in the strategic stockpile at 228 sites on that date. Of this total, inventories valued at $5.2 billion apply toward minimum objectives.

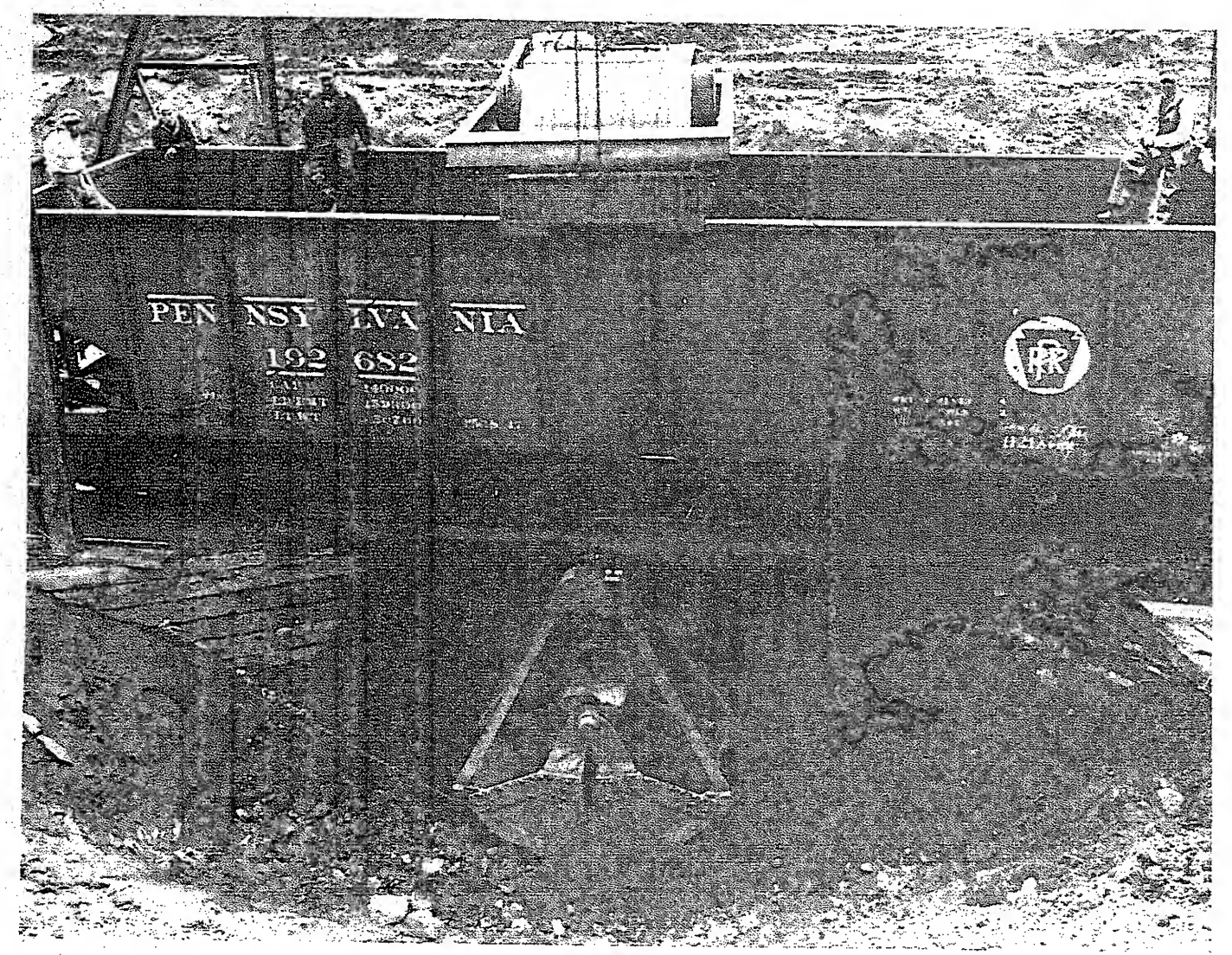
During the six months covered by this report stockpile inventories increased by about 500,000 tons valued at $177,100,000. Of this total, materials valued at $100,100,000 applied toward minimum objectives and $77,000,000 toward long-term objectives.

New stockpile purchases (obligations under fiscal year 1957) totaled $62,300,000 of which $14,200,000 were toward minimum objectives and the remaining $48,100,000 toward long-term objectives.

As of December 31, 1956 minimum objectives for 44 of the 75 stockpile materials and the long-term objectives for 12 of the 52 metals and minerals having long-term objectives had been attained.

Nine stockpile objectives for major materials were reviewed and another 20 were under way. Such reviews of supply-requirements and other data are necessary periodically to adjust the stockpile for changing defense and essential civilian uses of materials and for supply trends.

On December 31, 1956, Commodity Credit Corporation inventories of strategic and critical materials totaled $242,000,000 and the Corporation had outstanding barter agreements for an additional $370,000,000 worth of these materials for later transfer to the strategic or supplemental stockpiles.



Ore being unloaded for stockpile storage. Car shaker at top assures complete removal of contents. Shovel scoops ore from pit for transfer to stockpile.

CURRENT STOCKPILING ACTIVITIES

STATUS OF THE STOCKPILING PROGRAM ON DECEMBER 31, 1956

Under the Strategic and Critical Materials Stock Piling Act, inventories of 75 materials have been acquired in order to ". . . . decrease and prevent wherever possible a dangerous and costly dependence of the United States upon foreign nations for supplies of (strategic and critical) materials in time of national emergency."

These inventories, totaling about 24,500,000 tons, were valued at about $6.5 billion at December 31, 1956 prices. They increased by about 500,000 tons during the six month period July 1 through December 31, 1956, covered by this report, at a cost of $177,100,000. Materials on order for future delivery to the stockpile amount to $350,000,000 at the end of 1956.

A summary of stockpile purchases and deliveries is shown in Table 1. Stockpile procurement emphasizes filling minimum stockpile objectives as rapidly as feasible while avoiding undue effects on the market. Long-term objectives are established to provide greater protection against full mobilization needs. The additional quantities guard against any reliance in time of emergency on overseas sources except those immediately accessible. Consequently, acquisitions toward the long-term increment, after minimum objectives are filled, have a lower order of priority.

Table 1.—Strategic Stockpile Purchases and Deliveries by Source During July-December 1956

[Millions of dollars]

Source	Toward minimum objectives		Additional toward long-term objectives		Total	
	Deliveries	New purchases[1]	Deliveries	New purchases[1]	Deliveries	New purchases[1]
Open market	80.8	6.9	72.0	43.1	152.8	50.0
DPA account[2]	3.6	3.8	2.5	2.5	6.1	6.3
CCC account	13.5	1.3	.....	.....	13.5	1.3
Other[3]	2.2	2.2	2.5	2.5	4.7	4.7
Total	100.1	14.2	77.0	48.1	177.1	62.3

[1] New purchases represent obligations entered into under the fiscal year 1957 procurement program. During the six months a total of $87,300,000 was paid for materials ordered before July 1, 1956.

[2] Represents transfers to the stockpile from inventories received as a result of contracts financed under the Defense Production Act.

[3] Materials acquired without cost to the stockpile by surplus transfer or deliveries from prior programs under authority of foreign aid legislation.

Source: General Services Administration.

Principal materials acquired for the stockpile during the six months period were metallurgical chromite, copper, iodine, synthetic manganese dioxide, phlogopite mica splittings, nickel, lead and zinc. All but lead and zinc were acquired toward minimum stockpile objectives.

BARTER FOR STOCKPILE

The Commodity Credit Corporation authority to barter surplus agricultural commodities for stockpile materials has been used in part to fill strategic stockpile objectives. Certain materials acquired by barter will be placed in the "supplemental" stockpile which is additional to the strategic stockpile and which was authorized in the Agricultural Trade Development and Assistance Act of 1954. Barter during the six months totaled $20,000,000 for acquisitions toward long-term objectives and $113,000,000 for the supplemental stockpile. On December 31, 1956, inventories in the Commodity Credit Corporation account for transfer to the long-term stockpile totaled $115,000,000, while $127,000,000 worth of materials was held for transfer to the supplemental stockpile. Materials to be delivered against outstanding barter contracts totaled $370,000,000.

STOCKPILE OBJECTIVE REVIEWS

During the six months covered by this report nine stockpile objectives were reviewed to adjust as necessary for changing defense or essential civilian requirements and supply trends. Changes in the list of stockpile materials and in objectives occur as new potential emergency uses of materials arise, as substitutes are developed or as the supply outlook improves or deteriorates. The

nine reviews completed during this period resulted in five changes in objectives: (a) 3 materials have higher objectives, (b) one material, small diamond dies, was added to the List of Strategic and Critical Materials for Stockpiling (shown in Appendix B) by transfer from Group II to Group I, and (c) optical glass was removed from Group II of the List. At present, 20 additional reviews are under way.

COMPLETED STOCKPILE OBJECTIVES

Stockpile inventories are reported as meeting minimum objectives for 44 materials, representing no change during these six months. Tin was added to the list of filled long-term objectives, bringing this total to 12. The lists of these materials, shown in Tables 2 and 3, are subject to change depending on stockpile inventories and on the results of reviews of objectives. This listing includes only stockpile inventories.

Table 2.—Certain Materials for Which the Stockpile Inventory Meets the Minimum Objective

- Abrasives, Crude Aluminum Oxide
- Agar
- Aluminum
- Asbestos, Chrysotile
- Asbestos, Crocidolite
- Bauxite, Metal Grade, Surinam Type
- Beryl
- Bismuth
- Cadmium
- Castor Oil
- Coconut Oil
- Columbite
- Cordage Fibers, Abaca
- Cordage Fibers, Sisal
- Cotton, Extra Long Staple
- Diamonds, Industrial Stones
- Graphite, Ceylon—Crystalline and Amorphous
- Graphite, Madagascar—Crystalline Flake and Fines
- Graphite, Other Than Ceylon and Madagascar—Crystalline
- Hyoscine
- Lead
- Manganese, Battery Grade, Natural Ore
- Manganese, Metallurgical Grade
- Mercury
- Mica, Muscovite Splittings
- Palm Oil
- Platinum Group Metals, Iridium
- Platinum Group Metals, Platinum
- Pyrethrum
- Quartz Crystals
- Quinidine
- Rare Earths
- Rubber, Natural
- Silk, Raw
- Silk Waste and Noils
- Sperm Oil
- Tantalite
- Tin
- Tungsten
- Vanadium
- Vegetable Tannin, Chestnut
- Vegetable Tannin, Quebracho
- Vegetable Tannin, Wattle
- Zinc

Table 3.—Certain Materials for Which the Stockpile Inventory Meets the Long-Term Objective

- Abrasives, Crude Aluminum Oxide
- Asbestos, Crocidolite
- Graphite, Madagascar—Crystalline Flake and Fines
- Graphite, Other Than Ceylon and Madagascar—Crystalline
- Manganese, Battery Grade, Natural Ore
- Mercury
- Platinum Group Metals, Iridium
- Platinum Group Metals, Platinum
- Rare Earths
- Tantalite
- Tin*
- Vanadium

*Addition to list previously reported.

STORAGE AND MAINTENANCE

Strategic and critical materials were stored at 228 locations as of December 31, 1956, as follows:

	December 31, 1956	Change in six months
Military depots (including 2 vaults)	65	.....
General Services Administration warehouses (including 2 vaults)	15	.....
Other Government-owned sites (including 3 vaults)	7	.....
Industrial plant sites	37	+1
Leased commercial sites (including 2 vaults)	10	.....
Commercial warehouses	86	-14
Commercial tank facilities	5	-1
Port storage sites	3	.....
Total	228	-14

Approximately 23,000,000 square feet of warehouse space, 60,000,000 square feet of open space, and 2,000,000 barrels of tank space are utilized at these locations.

During July-December 1956 approximately 1,100,000 tons of additional strategic materials were received and stored by the General Services Administration at these locations. Of this total tonnage, approximately 49% was added to strategic stockpile inventories, 32% to Defense Production Act inventories, and 19% to Commodity Credit Corporation inventories.

The problem of taking a stockpile inventory is complicated by the vast tonnage involved and the large number and diversity of sites utilized. All materials have been periodically inspected and inventory records carefully maintained; physical inventories have also been taken of some materials. A comprehensive project for taking a physical inventory of all stockpile materials was started in the first half of 1956 and the General Services Administration is now working on that inventory.

During July-December 1956 a physical inventory was undertaken at three Government storage facilities. One inventory was completed and those at the other two locations were well advanced by the end of the year. The experience gained in these physical inventories has been used to develop plans and procedures for taking such inventories at all other locations. The complete inventory is expected to take three years, after which inventory-taking will be repeated periodically.

ROLE OF RESEARCH AND DEVELOPMENT IN STOCKPILE MATERIALS

While stockpiling makes one of the most important contributions to the Nation's materials security, research and development also play an important role. As a result of these activities since 1946, new materials have been added while others have been removed from the list of stockpile materials, and changes have frequently been made in stockpile objectives. These changes may arise from: (1) the revision of military or essential civilian requirements because of the development of substitutes, (2) the utilization of newly developed improved processes or (3) discovery or development of increased supplies in the United States or other readily accessible sources.

To assure maximum effectiveness in the use of research and development funds, the Government utilizes the most promising and capable research facilities whether owned or sponsored by Government, non-profit institutions or industry. Before deciding to support a research program the Office of Defense Mobilization obtains the advice of other government agencies and the Materials Advisory Board in the National Research Council of the National Academy of Sciences. Advice is invited as to the desirability of a research program, the extent to which Government financial assistance should be extended and the availability of research facilities.

While most technological changes are accomplished by private research and development efforts, Government financed programs have produced substantial results. Regardless of the source of the new idea its possible impact on stockpiling must be promptly evaluated. The review of stockpile objectives accordingly takes into consideration these new developments and their effect on supply estimates and upon military and essential civilian requirements. Changes in objectives must be made promptly so that the stockpile does not become obsolescent because of evolving technology.

ADMINISTRATION OF STOCKPILE RESEARCH AND DEVELOPMENT

Legal Responsibility

Recognizing the vital role that research and development must play in stockpiling, Congress authorized and directed, in Sections 7(a) and (b) of the Stock Piling Act, the Department of the Interior and the Department of Agriculture to establish and maintain research programs aimed at increasing the availability and utilization of domestic resources wherever feasible in order to reduce United States dependence on foreign sources for supplies of strategic and critical materials in time of emergency. Later the Defense Production Act of 1950 and subsequent amendments provided authority for exploration, development, mining and processing of, and the development of substitutes for, strategic and critical materials. These Acts demonstrate the importance Congress has placed upon research and development.

Department of Agriculture Programs

The Agricultural Research Service within the Department of Agriculture has responsibility ". . . to make scientific, technologic and economic investigations of the feasibility of developing domestic sources of supplies of any agricultural material or for using agricultural commodities for the manufacture . . ." of strategic and critical materials or substitutes. These activities have substantially affected stockpile objectives for a number of materials. For example the successful establishment of domestic extra long staple cotton production reduced dependence upon foreign production. In addition to initiating and administering research programs, the Agricultural Research Service has entered into some research contracts with the General Services Administration.

Department of the Interior Programs

In cooperation with the Office of Minerals Mobilization three major sections of the Department of the Interior are engaged in exploration, research and development for stockpile materials: the Geological Survey, the Bureau of Mines and the Defense Minerals Exploration Administration.

The Geological Survey directs its efforts toward scientific research by field and laboratory studies, including systematic geologic mapping, geophysical and geochemical investigations and research into basic geological processes. Drilling, trenching and other physical exploration are used to test the geologic concepts developed during research investigations and help supply supporting data on occurrence, form and size of some types of deposits. Discoveries have already substantially affected stockpile objectives for certain materials, and work along these lines is continuing. Geological Survey studies have led to the discovery of large ore bodies of lead and zinc, cobalt, copper, chromite, rare earths and vanadium. New exploration techniques,

which employ both geochemical research and geophysical studies by ground and airborne methods have been made available for industrial use and have thereby assisted industry in the exploration and development of new reserves.

Closely coordinated with this work on strategic and critical materials are Bureau of Mines' activities which have: expanded knowledge on mineral reserves; improved extraction and mining technology; developed new and improved refining, smelting and processing technology; and developed new materials and promising new uses for existing materials. While the United States is still primarily dependent upon foreign sources for chromite, cobalt and beryl, research by the Bureau of Mines suggests that domestic reserves of some of these materials could be developed although at considerable expense, to meet emergency needs. The problem, of course, is that lower cost foreign supplies are available from deposits of a higher grade than the domestic reserves. Consequently, the Bureau of Mines research activities are directed toward more economic mining methods and refining and processing metallurgy.

The Defense Minerals Exploration Administration administers the Government program designed to encourage private exploration for new or undeveloped sources of strategic minerals. The program is authorized by the Defense Production Act. The Defense Minerals Exploration Administration assists private operators by helping finance exploration work specifically set forth in contracts, with a provision for repayment of the Government's contribution, without interest, from royalties on production which may result from favorable exploration. The royalty is limited to 5% of production for a period of 10 or more years or if the Government's contribution is fully repaid, for a shorter period. Technical staffs from the Bureau of Mines and the Geological Survey inspect properties and projects, report on applications and work progress, and provide field administration of the contracts.

By December 31, 1956, the Defense Minerals Exploration Administration had entered into 988 contracts obligating over $29,000,000 of Government financial assistance. Of this amount, approximately $17,350,000 had been paid for work accomplished. Discoveries had been certified on 276 projects with an ore value estimated at $295,000,000. Ores recovered from these discoveries had been sold for $31,500,000 and approximately $1,575,000 of Government advance had been repaid.

General Services Administration Programs

The General Services Administration conducts two types of stockpile research programs. First, [illegible] nsible for administering stock- [illegible] id storage, it conducts research processing, rotation, storage, security and maintenance of stockpile materials. This applied research is directed toward rendering the Government stockpiles more efficient and manageable and toward improving storage practices. Since for most stockpiled materials the Government inventories represent larger quantities than were ever accumulated before and usually represent storage for longer periods than was ever attempted before, from time to time new problems arise which require thorough investigation. For example, very pure tin will disintegrate under certain climatic conditions, and magnesium stocks produced during World War II and later put into the stockpile have deteriorated because of impurities. When such findings became known, corrective actions were ordered to preserve the stockpile. Such findings have first come to light in administering stockpile storage.

The other research and development responsibility of the General Services Administration arises from its contracting responsibility under the Defense Production Act.

Office of Defense Mobilization

When a Government agency recommends a research program on a stockpile material, the Office of Defense Mobilization evaluates the efforts being made by other Government agencies on the material, determines whether additional or expedited research should be undertaken and the method of financing it, and assigns responsibility for administration of the research to the General Services Administration. Normally, the delegate agency responsible for a material proposes that a research program be undertaken after conducting a comprehensive analysis of needs for research, the potential objectives to be covered, the approximate cost involved, the time period required and the available research resources. After this report and proposal have been received, the Office of Defense Mobilization may obtain further advice concerning the proposed research program from Government agencies and non-Government sources. This review process is designed to eliminate duplication of research efforts, to protect against projects which have little chance of success and to assure utilization of the most competent research sources. If after evaluating the reviews and comments the Office of Defense Mobilization determines that the research is to be undertaken, it assigns the program to the General Services Administration, and if necessary authorizes the expenditure of Defense Production Act funds.

Use by Government of Non-Government Facilities

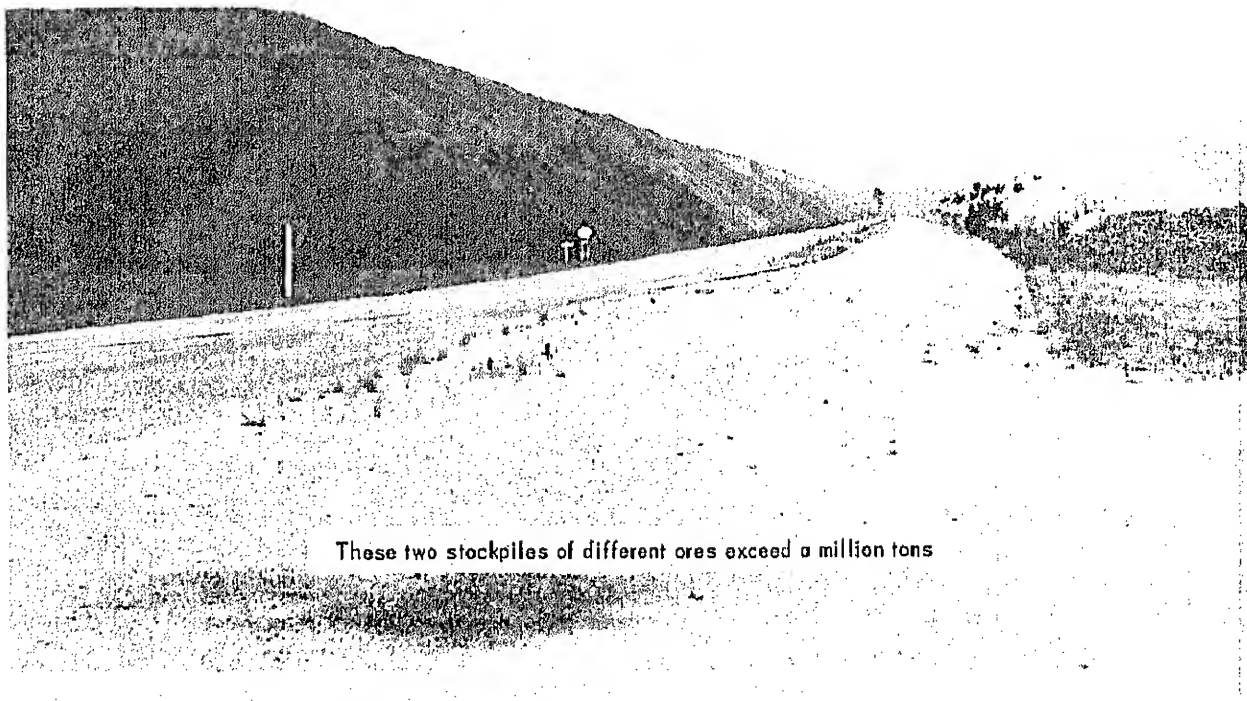
The organization to complete a research project is ordinarily proposed by the delegate agency at the time the research program is being developed. In some cases it may be selected by the General Services Administration after the program has been

approved. Normally the Government agency which carries on research of this type will receive the assignment with instructions to initiate the work or to expand or expedite existing work. In some cases it may be determined that non-Governmental research or development work can most effectively attain the desired objective. In selecting a non-Government organization, advice is obtained from the Materials Advisory Board, which has as members some of the leading specialists in the field of research to be undertaken. This advice may include a comparison with various projects currently under way which relate to the new project, the type of facilities and skills required and the approximate amount which should be expended.

SUMMARY OF EFFECTS OF RESEARCH AND DEVELOPMENT ON STOCKPILE MATERIALS

To assure that the stockpile continues to provide for the Nation's essential emergency needs, prudent stockpile management requires constant review of our changing technology. New developments must be reflected in stockpile objectives, whether or not an objective has been reached. Some stockpile inventories may no longer be required while others may have to be greatly increased. At this time the Government's maj managerial responsibility with respect to most the 75 stockpile materials is to be sure that th are stockpiled in the proper quantities and qualiti at the places where they may be needed. Futu emergency needs must be estimated and necessa technological changes matched by adjustments the stockpile program.

During the past five years private and public r search and development activities have resulted the deletion of 9 materials from, and the additi of 4 others to, the list of stockpile materials; n developments have required at least a 50% i crease in objectives for 12 materials and at lea a 25% reduction in the objectives for 26 other m terials. Of the 75 stockpiled materials, 49 ha been affected in a major way by research and d velopment activities during the past five yea These activities will continue to a large degr under private auspices. However, the Governme must continue its research and development activ ties where this is the most effective way to me urgent defense considerations. Resulting techn logical changes require continuous evaluation of t composition of the stockpiles to prevent the i ventories from becoming either excessive, i adequate or obsolescent.



These two stockpiles of different ores exceed a million tons

RESEARCH AND OTHER DEVELOPMENTS IN INDIVIDUAL STOCKPILE MATERIALS

This part shows specifically for many stockpile materials the effects of research and development on stockpile objectives during the past few years. It also includes a discussion of stockpile materials developments of interest during the July-December 1956 period covered by this report.

ALUMINUM.--Primary aluminum capacity in the United States at the end of 1956 exceeded the previously closed expansion goal of 1,746,000 tons. Producers have undertaken construction programs to raise primary production capacity to about 2,500,000 tons by the end of 1958. Since the minimum stockpile objective has been reached, the Government did not exercise its call rights for aluminum during 1956 and no calls are scheduled for the first half of 1957, thereby providing industry with an additional supply of 600,000 tons of aluminum during this 18 month period. Toward the end of 1956 the supply was so plentiful that producers announced intentions early in 1957 to deliver aluminum to the Government under earlier Defense Production Act expansion contracts. Several aluminum fabricating facilities expansion goals were closed in late 1956.

ANTIMONY.--During the six months covered by this report, efforts to procure antimony metal from domestic sources did not result in any offers; however, the Commodity Credit Corporation entered into barter contracts for additional quantities from foreign production for the supplemental stockpile.

ASBESTOS.--Through the years the stockpile objective for amosite asbestos has been substantially increased to meet certain military uses for which substitute materials are available only at higher price. On the other hand, the objectives for crocidolite and chrysotile asbestos have been decreased, because private mining interests have discovered large new deposits of chrysotile asbestos in this hemisphere, and because a substitute material, developed in private research laboratories, is deemed satisfactory for the critical use of crocidolite.

BERYL.--The acute shortage of beryl during the Korean conflict emphasized the importance of expanding supplies. The Government encouraged extensive exploration and development activities in the United States and abroad. Large deposits were located in other parts of the world and a more substantial domestic industry has been established. These expansions in supply permitted a slight reduction of the stockpile objective. The Government program to purchase domestically produced beryl is scheduled to continue until June 30, 1962, or when deliveries under the program total 4,500 short dry tons, whichever occurs first. By December 31, 1956, 1,203 tons had been purchased under this program.

HOG BRISTLES.--Development by private industry of satisfactory synthetic bristles for brushes made it possible in 1955 to remove hog bristles from the list of stockpile materials and to undertake disposal of the inventory. While the major work on this development was done by private industry, the Defense Department cooperated closely by conducting performance tests of the synthetic products at various stages and by revising specifications. Since most of the world supply of hog bristles comes from Communist China, the development of domestic substitutes has removed reliance on this foreign source.

Under the disposal program two offerings were made in July-December 1956. Approximately 524,000 pounds were sold for about $3,600,000. Prices received were equal to or above the original acquisition cost.

CASTOR OIL.--The reduction in the castor oil stockpile objective, which occurred some time ago, is a direct result of the research and development work of the Department of Agriculture. Starting in 1951 to develop commercial castor bean production in this country to meet current defense and stockpile needs, the work included improving breeds of castor beans, expanding knowledge of growing, harvesting and crushing, and developing the farmer's interest in this new crop. As a result of this work, yields exceeding a ton per acre can be mechanically harvested when grown on irrigated land, the types of seed which grow best in different parts of the southwest are known, and knowledge of crossbreeding and hybrid growth has been enlarged.

Field testing of several improved castor bean varieties was completed in November 1956 and two new varieties will be released to growers for planting in 1957. A new dwarf type castor bean is particularly adapted to production on irrigated land in the Texas high plains and in southern Oklahoma. Seed of this variety will be available in a substantial quantity to growers for planting in 1957.

CHROMITE.--During the summer of 1956 the domestic purchase program for metallurgical grade

chromite ore was extended two years to June 30, 1959, and amended to provide for the acceptance of chrome ore or concentrates at locations other than the Grants Pass Purchase Depot.

COBALT.--In the last half of 1956, barter transactions for surplus agricultural commodities included a substantial quantity of cobalt for the supplemental stockpile. Free world production of cobalt continued at a high rate thus assuring adequate supplies.

COCONUT OIL.--The development by private research facilities of other materials such as synthetic detergents which adequately meet certain former requirements for coconut oil together with an improved supply resulted in the reduction in the objective in 1954. During the last six months of 1956, more than 21,600,000 pounds of coconut oil were rotated out of west coast facilities and replaced with low fatty acid oil delivered to the Government tank farm on the east coast in order that the stockpile will be near potential consumers. This completed the removal of coconut oil from commercial storage facilities on the west coast. An experimental tank of refined coconut oil has remained almost unchanged in quality after nearly four years in storage.

COLUMBITE-TANTALITE.--The expanding knowledge of metallurgy resulted in a substantial increase in requirements for both columbite and tantalite which have been scarce materials. In order to meet the stockpile objectives an exploration, development and research program was undertaken during the Korean emergency. Certain essential requirements have been modified, some domestic reserves have been found, and improved techniques of refining, processing and alloying have been developed. Consequently, stockpile objectives have been considerably reduced from earlier levels and purchasing for the stockpile has been discontinued. Expansion contracts of previous years are still providing some deliveries into Defense Production Act inventories.

COPPER.--At the outset of the Korean conflict it became clear that the United States required development of additional copper supplies to meet increased defense needs including stockpile purchases. A Government expansion program calling for an additional 300,000 tons per year has been attained. In some instances, Government floor price purchase contracts provide guaranteed markets for limited periods of time. Completion of this expansion program has substantially improved the Nation's copper defense preparedness position. Late in 1956, the copper market eased sufficiently to permit the Government to resume acquisitions of copper for the stockpile and the Defense Production Act account under expansion contracts written several years earlier, and deliveries were started of quantities previously deferred by the Government because of tight market conditions.

CORDAGE FIBERS.--The rotation program for cordage fibers was accelerated in July-December 1956 when approximately 35,000,000 pounds were rotated. Of this amount about 22,000,000 pounds were abaca and 13,000,000 pounds were sisal. Since July 1, 1956, all abaca produced at the Central American plantations has been transferred to the stockpile to replace material sold under the rotation program, and arrangements were made to reactivate the Good Hope, Costa Rica, plantation in accordance with the Office of Defense Mobilization authorization to place additional acreage in production. A testing program is being continued to determine the storage life of cordage fibers.

CORUNDUM.--Corundum was stockpiled to meet essential uses such as grinding optical glass and similar hard materials. Through the years the development by domestic industry of other readily available abrasives has made it unnecessary to procure additional corundum for the stockpile. The existing inventory of corundum is held in Government account as a Group II material. Group II materials are retained because of potential strategic importance, and the inventories are increased only when Government-owned surpluses can be transferred to the inventory without expense to the stockpile program.

COTTON, EXTRA LONG STAPLE.--Research and development activities have brought into question the need for stockpiling extra long staple cotton. Substitutes have been developed for many essential uses requiring extra long staple cotton. Also the Agricultural Research Service has developed new and improved domestic varieties of extra long staple cotton which are competitive in quality with foreign grown cotton of this type and which produce a greater yield per acre than previous domestic varieties. During 1956, when supplies of Egyptian extra long staple cotton available to this country were well below the level of previous years, domestic consumers turned increasingly to United States production and not only absorbed practically the entire 1956 crop but also consumed a substantial part of the large Commodity Credit Corporation inventory accumulated from the 1953, 1954 and 1955 crops.

EMETINE.--This drug was on the stockpile list because it was needed in the cure of amoebic dysentery. Private research, however, has yielded several more effective materials now readily available in the United States. The need for stockpiling emetine was therefore eliminated, and the inventory is being sold.

FEATHERS AND DOWN, WATERFOWL.--Until recently waterfowl feathers and down were the only light weight material satisfactory for use in military sleeping bags. Research sponsored by the

Army Quartermaster Corps has indicated that new domestic synthetic fibers and certain grades of treated chicken feathers could displace waterfowl feathers and down. As a result further procurement has been discontinued pending the outcome of efforts to adapt these alternate materials for use in military sleeping bags.

FLUORSPAR.--In July 1956 a premium price purchase program for domestic metallurgical grade fluorspar at $5.50 per short ton above the then prevailing market prices was announced. Under this plan only limited amounts of metallurgical grade fluorspar were purchased because of producers' difficulties in meeting stockpile specifications or of objections to the prices established under the program. An Office of Defense Mobilization authorization to eliminate the transportation price differential between western and midwestern producers and thereby to pay uniform prices to all domestic producers is expected to increase purchases from western producers.

HYOSCINE.--This imported drug has been included in the stockpile because of its importance in providing relief for motion sickness. Private research laboratories have recently developed a synthetic substitute which can be manufactured in this country; consequently, the objective was reduced in 1955.

IODINE.--Although iodine has been on the stockpile list for some time, research within the Department of Defense has resulted in a substantial increase in military requirements primarily for water purification. Accordingly the stockpile objective was increased in 1955.

KYANITE.--Because of its essential industrial uses imported kyanite was originally included on the stockpile list. Research by private industry and the Bureau of Mines on mullite in its natural form and on synthetic mullite eventually established the fact that synthesis was commercially feasible and the product was capable of serving all uses of kyanite. As a consequence of this development kyanite was removed from the list of stockpile materials in 1954.

LEAD-ZINC.--During the last half of 1956 purchases of domestically produced lead and zinc continued with deliveries being applied toward the long-term stockpile objectives. From June to December 1956, the Commodity Credit Corporation contracted for substantial additional quantities of lead and zinc for the supplemental stockpile under barter arrangements.

MANGANESE.--Through the years a number of developments have substantially affected stockpiling of manganese. The Signal Corps efforts to obtain improved dry cell batteries to meet the most severe military requirements stimulated the development of synthetic battery grade manganese dioxide by both electrolytic and chemical processes in the United States. Government financial assistance was extended to producers to encourage them to establish and operate production facilities and this product was added to the stockpile list in 1954. Producers are now successfully supplying the growing commercial market for this superior battery material and three producers are making sizable deliveries to the stockpile.

Industrial research on chemical grade manganese has increased essential civilian requirements so much that in 1950 it was added to the stockpile list and the objective was increased in 1955.

The General Services Administration research program on metallurgical manganese includes projects (1) to test the feasibility of using certain "oil emulsion and soap flotation" methods for beneficiating sub-grade oxide and carbonate ores, (2) to operate a pilot plant using the "hi-arc electric" process for the recovery of manganese from rhodonite ores, (3) to operate a pilot plant using a roasting process for "pre-conditioning open-hearth slags and complex siliceous" manganese ores in order to render them amenable to further treatment, by leaching or double smelting, for recovery of their contained manganese, and (4) to provide further pilot plant testing of various solvents and operational procedures for leaching.

MICA.--The United States is almost entirely dependent upon foreign sources for its supplies of strategic block and film mica. Although a premium price program was established during the Korean conflict to encourage the development of domestic mica production, it has failed to produce significant quantities of block and film mica of stockpile quality. Completing the minimum stockpile objectives for strategic block and film mica within a reasonable time appears unlikely. Development of new materials or processes that will obviate the necessity for natural mica in the electric and electronics industries seems to be the most desirable solution to the problem.

The General Services Administration has been assigned responsibility to administer a mica research program. The Bureau of Mines program on synthetic mica has been expanded and accelerated especially in basic research aimed at developing the most efficient crystal-growing techniques to yield the most suitable quality of synthetic mica either in large sheets or for use in the production of reconstituted mica. Recently two private companies have undertaken research programs to develop synthetic sheet mica, based on processes originally developed in Bureau of Mines research laboratories.

The National Bureau of Standards recently developed a laboratory machine for testing waviness in mica under a contract with the General Services Administration. The machine, demonstrated in December 1956, may prove a great aid in evaluating mica for the stockpile. Discussions were held

with several equipment manufacturers concerning the production of this machine.

MOLYBDENUM.--During 1956 molybdenum scheduled for delivery to the Government continued to be diverted to industry in view of the relatively satisfactory defense position and the continued strong industrial demand.

NICKEL.--Diversions of scheduled shipments to the Government during the last six months of 1956 were increased to 42,300,000 pounds to help pressing demands for industrial nondefense use. Diversions totaled 76,600,000 pounds during 1956. The Government withdrew from the market to the maximum extent consistent with contractual obligations during the final quarter of the year and announced that it would continue to do so through the first quarter of 1957. Almost half of the 140,000,000 pound nickel expansion goal deficit may be covered by an expansion program announced by the major producer in early December. Negotiations for other expansion were still in progress at the close of the year and one contract has since been signed covering new production of 50,000,000 pounds per year.

OPIUM.--Research activities undertaken by the Agricultural Research Service have contributed considerably to the reduction of United States dependence on foreign sources of opium. Private research activities have uncovered substitutes for morphine which are desirable for certain uses. Discoveries by the Agricultural Research Service have simplified and improved the extraction of morphine from the opium poppy. The new methodology uses the entire plant which is harvested, ground and processed to produce crude opium.

In order to enable the United States to grow opium in event of emergency, the Department of Agriculture maintains a seed inventory which has been subjected to research to improve the strains and to increase the seed viability. This research work is continuing.

PALM OIL.--Since palm oil is not produced in quantity in the United States, the Agricultural Research Service has been experimenting with the use of inedible fats as a substitute. This research helped the steel industry to use these processed fats in place of palm oil in "cold rolling" steel and in "hot dip" tin plating of steel sheets. An additional development traceable to the research activities of private companies has led to the electroplating process of tin plating which does not require palm oil. These developments have resulted in a substantial decrease in requirements and in the objective. Palm oil in excess of stockpile needs has been declared obsolescent and is being sold by the General Services Administration. Approximately 17,200,000 pounds were sold during July-December 1956 under the disposal plan for palm oil. This total included the remaining 12,000,000 pounds in commercial storage facilities. An experimental tank of refined palm oil has shown only a negligible change in free fatty acids after more than three years of storage.

PLANTINUM.--Three platinum group metals are currently stockpiled--iridium, palladium and platinum. Recent developments indicated that palladium, which is considerably less expensive than platinum, can be substituted for platinum for many of its essential uses. Accordingly, early in 1956 an objective was established for palladium and the platinum objective was reduced.

PYRETHRUM.--The Agricultural Research Service has developed a more effective insecticide, allethrin, for many uses which previously required imported pyrethrum. Pyrethrum, nevertheless, is still being retained in the stockpile because allethrin now manufactured domestically does not meet all pyrethrum requirements. However, the objective has been substantially reduced and the surplus stockpile inventory declared obsolescent.

QUININE.--The development by private laboratories of more effective substitutes for quinine has led to their widespread acceptance in this country. Accordingly military and essential civilian specifications have been revised to permit use of the readily available substitutes and quinine was removed from the list of stockpile materials in 1954.

RARE EARTHS.--Because the shortage of supplies of rare earths became so acute during the Korean conflict, the Government launched an extensive program to expand reserves, using Defense Production Act funds and assistance. At that time Brazil and India were the dominant suppliers. As a consequence additional deposits have been located in other parts of the world as well as in the United States, thus reducing dependence on the two sources.

A company with a daily capacity of 15 to 25 tons of crude ore has begun upgrading monazite now in the stockpile. Operating under contract with the Atomic Energy Commission, the thorium salts are to be delivered to the Atomic Energy Commission, and a purified mixture of the rare earths is to be returned to the stockpile.

SELENIUM.--In 1953 selenium was added to the stockpile list because of developments in selenium rectifiers for electronics uses. World demand for selenium increased rapidly, keeping ahead of expansion of supplies until late in 1956. The shortage of selenium stimulated research into other more readily available substitutes. Sufficient progress has been made in the substitute use of silicon and germanium to alleviate what otherwise would be a difficult stockpile situation for selenium. The General Services Administration is responsible for administering a selenium research program. Since 1954 the Bureau of Mines

has been examining and sampling mines and prospects and trying to develop better and cheaper methods for recovering high grade selenium from those ores representing a potential reserve.

SILK, WASTE AND NOILS.--Silk has been used for many years in the form of bags for propellant powder. To meet this use, silk waste and noils have been stockpiled. Research and field testing within the Department of Defense have shown that, for most powder bag requirements, domestically available substitutes may be as effective and cheaper. This research and development has made possible a lowering of the stockpile objective.

SILK, RAW.--In addition to the silk waste and noils stockpile, a small stockpile of raw silk is maintained for certain highly specialized uses such as the production of precision woven fabrics for sifting and grading and for screen printing, medical sutures, etc. The development of other materials suitable for many of the uses for which raw silk was formerly required has permitted a drastic reduction in this stockpile objective.

TALC, STEATITE, BLOCK.--This grade of talc serves a number of essential engineering purposes. Domestic substitutes have not been available and during World War II an acute shortage arose. The Signal Corps has been engaged in an extensive research program to develop a satisfactory substitute. While it is not yet clear that such research has been successful, promising results have been obtained to date by use of phosphate bonded talc.

TIN.--As discussed in connection with palm oil, industry has engaged in extensive research to reduce requirements for tin and tin plating on metal cans. Satisfactory results have been achieved along two directions: first, reducing the thickness of the tin coating by substituting electrolytic and differential tin coating of the steel sheet; second, for many uses resins have been developed which substitute for tin coating by effectively preserving the steel sheet from deteriorating or from contaminating the contents of a can. These research activities have led to a substantial reduction in requirements for tin. On the other hand, recent military developments and the expansion in essential civilian needs have been such that the stockpile remains essential.

TITANIUM.--Bureau of Mines research work on titanium in process since 1938 has produced substantial results. In 1948 the first commercial production of titanium sponge started. Within a few years the Government authorized the use of Defense Production Act funds to help create productive capacity and authorized the use of Government funds for additional research into alternate methods of producing the metal and into techniques and processes for smelting, rolling, shaping and alloying this new material. Currently, five United States companies produce titanium sponge and by the end of 1958 their annual productive capacity will be approximately 30,000 tons. Several other companies have announced their intention to produce titanium sponge without Government assistance. Since titanium sponge first came on the market in volume, the price has dropped from $5 to $2.75 per pound. Decreasing prices, assurance of a steady supply and developments in the technology of processing titanium may permit increasing acceptance for aircraft, missiles and other defense applications. The research program for titanium, administered by the General Services Administration, includes projects under the jurisdiction of the Bureau of Mines, the Department of Defense and many producers and processors. The Department of Defense also helps finance the Titanium Metallurgical Laboratory which coordinates all technical information on titanium and furnishes consulting and engineering service to industry and government.

VANADIUM.--The interest in developing domestic sources of uranium has had a substantial impact on the size of the vanadium stockpile. While a few years back much vanadium used in the United States was imported, now the United States is an exporter because of the availability of vanadium as a by-product in uranium refining. This by-product of the atomic energy program illustrates the interrelationship between stockpiling and other Governmental research and development activities.

VEGETABLE TANNINS.--Imported vegetable tannins are stockpiled because they are required for tanning and certain other essential uses. The Agricultural Research Service has continued for several years research into a possible substitute--canaigre. This plant, now grown experimentally in the Southwest, produces a tannin extract which is currently being tested in shoes manufactured for the Quartermaster Corps. Research work covers methods of growing the plant, improving the harvesting and extracting processes and finally processing into a satisfactory tanning material.

The "mountains" at top of picture are ore stockpiles. Lead is stockpiled in the foreground.

APPENDIX A

FINANCIAL SUMMARY OF STOCKPILE OPERATIONS AS OF DECEMBER 31, 1956

TABLE I STATUS OF OBLIGATIONAL OPERATIONS

AS OF DECEMBER 31, 1956

AUTHORITY	APPROPRIATED FUNDS a/	AUTHORIZATIONS FOR: MAKING ADVANCE CONTRACTS b/	AUTHORIZATIONS FOR: LIQUIDATING OUTSTANDING ADVANCE CONTRACTS c/	TOTAL OBLIGATIONAL AUTHORITY (CUMULATIVE) d/
Under PL 117 - 76th Congress				
PL 361 - 76th Congress, August 9, 1939	$ 10,000,000	$	$	$ 10,000,000
PL 442 - 76th Congress, March 25, 1940	12,500,000			22,500,000
PL 667 - 76th Congress, June 26, 1940	47,500,000			70,000,000 e/
Under PL 520 - 79th Congress				
PL 663 - 79th Congress, August 8, 1946	100,000,000	-	-	100,000,000
PL 271 - 80th Congress, July 30, 1947	100,000,000	75,000,000	-	275,000,000
PL 785 - 80th Congress, June 25, 1948	225,000,000	300,000,000	-	800,000,000
PL 785 - 80th Congress, June 25, 1948	75,000,000	-	75,000,000	800,000,000
PL 119 - 81st Congress, June 23, 1949	40,000,000	270,000,000	-	1,110,000,000
PL 150 - 81st Congress, June 30, 1949	275,000,000	250,000,000	-	1,635,000,000
PL 150 - 81st Congress, June 30, 1949	250,000,000	-	250,000,000	1,635,000,000
PL 434 - 81st Congress, October 29, 1949	-	-	100,000,000 f/	1,535,000,000
PL 759 - 81st Congress, September 6, 1950	365,000,000	-	240,000,000	1,660,000,000
PL 759 - 81st Congress, September 6, 1950	240,000,000	125,000,000	-	2,025,000,000
PL 843 - 81st Congress, September 27, 1950	573,232,449 g/	-	-	2,598,232,449
PL 911 - 81st Congress, January 6, 1951	1,834,911,000	-	-	4,433,143,449
PL 253 - 82nd Congress, November 1, 1951	590,216,500	-	-	5,023,359,949
PL 253 - 82nd Congress, November 1, 1951	200,000,000	-	200,000,000	5,023,359,949
PL 455 - 82nd Congress, July 25, 1952	203,979,000	-	70,000,000	5,157,338,949
PL 176 - 83rd Congress, July 31, 1953	-	-	30,000,000	5,127,338,949
PL 428 - 83rd Congress, June 24, 1954	-	-	27,600,000	5,099,738,949
PL 663 - 83rd Congress, August 26, 1954	379,952,000 h/	-	-	5,479,690,949
PL 112 - 84th Congress, June 30, 1955	321,721,000 i/	-	-	5,801,411,949
PL 112 - 84th Congress, June 30, 1955	27,400,000	-	27,400,000	5,801,411,949
Total PL 520	5,801,411,949 j/	1,020,000,000	1,020,000,000	5,801,411,949
TOTAL PL 117 AND PL 520	5,871,411,949 j/	1,020,000,000	1,020,000,000	5,871,411,949

a/ Congressional appropriations of funds for stockpiling purposes.
b/ Congressional appropriations of contracting authority for stockpiling purposes in advance of appropriation of funds.
c/ Congressional authorization to liquidate outstanding obligations incurred under previously granted advance contract authority.
d/ Cumulative total of appropriated funds and advance contract authorization, less authorization to liquidate outstanding advance contracts.
e/ Excludes $8,845,792 received from sale of stockpile materials for wartime consumption. Receipts were returned to Treasury, February 1948.
f/ Cancellation of previously authorized authority to make contracts.
g/ Excludes $25,404,921 transferred to operating expenses for rehabilitation of Government-owned material producing plants.
h/ Excludes $48,000 transferred to Transportation and Public Utilities Service, GSA
i/ Excludes $430,000 transferred to Transportation and Public Utilities Service, GSA and $199,349,000 transferred to General Fund Receipt on June 27, 1956 - PL 623 - 84th Congress.
j/ Excludes receipts from rotational sales.

Source: General Services Administration

Table 2 TOTAL OBLIGATIONS AND EXPENDITURES OF STOCKPILING FUNDS

CUMULATIVE AND BY FISCAL PERIOD, THROUGH DECEMBER 31, 1956

FISCAL PERIOD	OBLIGATIONS INCURRED a/		EXPENDITURES b/	
	NET CHANGE BY FISCAL PERIOD	CUMULATIVE AS OF END OF PERIOD	BY FISCAL PERIOD	CUMULATIVE AS OF END OF PERIOD
Prior to Fiscal Year 1947	$ 54,983,152	$ 54,983,152	$ 54,970,732	$ 54,970,732
Fiscal Year 1947	68,888,533	123,871,685	11,359,999	66,330,731
Fiscal Year 1948	252,901,411	376,773,096	82,907,575	149,238,306
Fiscal Year 1949	459,766,881	836,539,977	304,486,177	453,724,483
Fiscal Year 1950	680,427,821	1,516,967,698	440,834,970	894,559,453
Fiscal Year 1951	2,075,317,099	3,592,284,897	655,537,199	1,550,096,652
Fiscal Year 1952	948,117,547	4,540,402,444	844,683,459	2,394,780,111
Fiscal Year 1953	252,375,163	4,792,777,607	906,158,850	3,300,938,961
Fiscal Year 1954	116,586,681	4,909,364,288	644,760,321	3,945,699,282
Fiscal Year 1955	321,799,833	5,231,164,121	801,310,094	4,747,009,376
Fiscal Year 1956 c/	251,692,667	5,482,856,788	382,011,786 c/	5,129,021,162 c/
Fiscal Year 1957-First Half	70,016,689	5,552,873,477	133,843,995	5,262,865,157

a/ Figures are the sum of obligations incurred under PL 520, 79th Congress and PL 117, 76th Congress. Final obligations under PL 117, 76th Congress were incurred in Fiscal Year 1949.

b/ Figures are the sum of expenditures under PL 520, 79th Congress and PL 117, 76th Congress. Final expenditures under PL 117, 76th Congress were made in Fiscal Year 1951.

c/ 1956 and subsequent fiscal periods and cumulative expenditures are reported on an accrual basis.

Source: General Services Administration

TABLE 3 EXPENDITURES OF STOCKPILING FUNDS, BY TYPE

CUMULATIVE AND FOR FISCAL YEAR 1957

TYPE OF EXPENDITURE	CUMULATIVE THROUGH a/ JUNE 1956	SIX MONTHS ENDED DECEMBER 31, 1956	CUMULATIVE THROUGH a/ DECEMBER 31, 1956
Expenditures			
Gross Total	$5,533,645,347	$163,644,360	$5,697,289,707
Less: Adjustments for Receipts from Rotation Sales and Reimbursements	404,624,185	29,800,365	434,424,550
Net Total	5,129,021,162	133,843,995	5,262,865,157
Material Acquisition Costs, Total	4,907,878,316	124,149,063	5,032,027,379
Stockpile Maintenance Costs, Total	190,991,515	8,145,799	199,137,314
Facility Construction	43,928,014	0	43,928,014
Storage and Handling Costs	120,191,344	5,731,207	125,922,551
Net Rotation Costs	26,872,157	2,414,592	29,286,749
Administrative Costs	30,151,331	1,549,133	31,700,464

a/ Cumulative figures are the total of expenditures under PL 117, 76th Congress and PL 520, 79th Congress. Expenditures under PL 117, 76th Congress totaled $70,000,000, of which $55,625,237 was for materials acquisition costs and $14,374,763 was for other costs. Final expenditures under PL 117 were made in FY 1951.

Source: General Services Administration

APPENDIX B

LIST OF STOCKPILE MATERIALS

MARCH 1, 1957

The materials listed below are currently included in the stockpiling program. Not all of the materials are under active procurement.

GROUP I MATERIALS

The materials listed in this section constitute Group I and have been or may be acquired through purchase pursuant to Section 3(a) and by transfer of Government owned surpluses pursuant to Section 6(a) of Public Law 520, 79th Congress.

1. Abrasives, Crude Aluminum Oxide
2. Agar
3. Aluminum
4. Antimony
5. Asbestos, Amosite
6. Asbestos, Chrysotile
7. Asbestos, Crocidolite
8. Bauxite, Metal Grade
9. Bauxite, Refractory Grade
10. Beryl
11. Bismuth
12. Cadmium
13. Castor Oil
14. Celestite
15. Chromite, Chemical Grade
16. Chromite, Metallurgical Grade
17. Chromite, Refractory Grade
18. Cobalt
19. Coconut Oil
20. Columbite
21. Copper
22. Cordage Fibers, Abaca
23. Cordage Fibers, Sisal
24. Cotton, Extra Long Staple
25. Diamond Dies, Small
26. Diamonds, Industrial, Bort and Stones
27. Feathers and Down, Waterfowl
28. Fluorspar, Acid Grade
29. Fluorspar, Metallurgical Grade
30. Graphite, Ceylon-Crystalline and Amorphous
31. Graphite, Madagascar-Crystalline Flake and Fines
32. Graphite, other than Ceylon and Madagascar-Crystalline
33. Hyoscine
34. Iodine
35. Jewel Bearings
36. Lead
37. Magnesium
38. Manganese, Battery Grade, Natural Ore
39. Manganese, Battery Grade, Synthetic Dioxide
40. Manganese, Chemical Grade, Type A Ore
41. Manganese, Chemical Grade, Type B Ore
42. Manganese Ore, Metallurgical Grade
43. Mercury
44. Mica, Muscovite Block, Stained A/B and Better
45. Mica, Muscovite Film, First and Second Qualities
46. Mica, Muscovite Splittings
47. Mica, Phlogopite Splittings
48. Molybdenum
49. Nickel
50. Opium
51. Palm Oil
52. Platinum Group Metals, Iridium
53. Platinum Group Metals, Palladium
54. Platinum Group Metals, Platinum
55. Pyrethrum
56. Quartz Crystals
57. Quinidine
58. Rare Earths
59. Rubber, Crude Natural
60. Selenium
61. Shellac
62. Silicon Carbide, Crude
63. Silk, Raw
64. Silk Waste and Noils
65. Sperm Oil
66. Talc, Steatite, Block
67. Tantalite
68. Tin
69. Titanium Sponge
70. Tungsten
71. Vanadium
72. Vegetable Tannin Extract, Chestnut
73. Vegetable Tannin Extract, Quebracho
74. Vegetable Tannin Extract, Wattle
75. Zinc

GROUP II MATERIALS

The materials lised in this section have been acquired principally through transfer of Government-owned surpluses pursuant to Section 6(a) of Public Law 520, 79th Congress, and constitute Group II. None is under procurement.

1. Bauxite, Abrasive
2. Corundum
3. Cryolite, Natural
4. Diamond Dies
5. Mica, Muscovite Block, Stained B and Lower
6. Mica, Phlogopite Block
7. Rutile
8. Sapphire and Ruby
9. Talc, Steatite, Ground
10. Wool
11. Zirconium Ore, Baddeleyite
12. Zirconium Ore, Zircon

APPENDIX C

REPORTS ISSUED BY THE DEPARTMENT OF THE INTERIOR, JULY - DECEMBER 1956

BUREAU OF MINES

Reports of Investigations

5238 Exploration and utilization studies, John Day chromites, Oregon.
5239 Separation of tantalum-columbium by solvent extraction.
5240 Brecciated manganese deposits in Johnson County, Tennessee.
5242 Spectrophotometric determination of tantalum with gallic acid.
5243 Selective extraction of mercury and antimony from cinnabar-stibnite ore.
5245 Laboratory concentration of various Alaska copper ores.
5246 Mineral-dressing investigations of the recovery of pyromorphite from a Newton County, Missouri, deposit.
5247 Fabricating consumable electrodes of zirconium, titanium, and similar metals for arc melting.
5248 Titanium plant at Boulder City, Nevada: Operating costs.
5250 Experimental magnesium alloys containing nickel, manganese, lithium, and aluminum.
5253 Helium and argon as inert atmospheres in producing titanium.
5254 Investigation of the Black Wonder manganese deposits, Santa Clara and Stanislaus Counties, California.
5255 Utilizing offgrade manganese materials from Montana.
5256 Spectrochemical analysis of titanium and titanium alloys by a porous cup-spark method.
5261 Beneficiation studies of nickeliferous ores from the Shamrock mine, Jackson County, Oregon, and the Congress mine, Ferry County, Washington.
5262 A mineral-dressing study of manganese deposits of west-central Arkansas.
5265 Production of titanium castings.
5268 Electric smelting of low-grade chromite concentrates.
5271 Chloridization of Maine manganese ore. Preliminary batch-fluidization tests on Maple Mountain-Hovey Mountain samples.
5275 Producing magnesium by sillicothermic reduction.
5281 Development of a chloride volatilization process for manganese ores from Aroostook County, Maine: Progress report.

Information Circulars

7752 Ceramic industry development and raw-material resources of Oregon, Washington, Idaho and Montana.
7758 Block-caving at the Kelley mine, the Anaconda Company, Butte, Montana. (Copper)

U. S. GEOLOGICAL SURVEY

Professional Papers

274-K Stratigraphy of Middle Ordovician rocks in the zinc-lead district of Wisconsin, Illinois, and Iowa.
275 Geology and mineral resources of the Ivanpah quadrangle, California and Nevada. (Rare earths)
284 Geology and ore deposits of the Zimapan mining district, State of Hidalgo, Mexico. (Silver, lead, zinc)

Bulletins

1000-E Geochemical studies in the southwestern Wisconsin zinc-lead area.
1024-E Pyrite deposits at Horseshoe Bay, Latouche Island, Alaska. (Copper)
1027-M Reconnaissance geology of western Mineral County, Montana. (Lead, zinc, silver, copper)
1027-N Mineral resources of the San Carlos Indian Reservation, Arizona. (Asbestos)
1027-O Thorium and rare-earth minerals in Powderhorn district, Gunnison County, Colorado.
1030-D Accuracy of ore-reserve estimates for uranium-vanadium deposits on the Colorado Plateau.
1030-F Geology and monazite content of the Goodrich quartzite, Palmer area, Marquette County, Mich. (Rare earths)
1032-B Geology and ore deposits of the Freeland-Lamartine district, Clear Creek County, Colorado. (Gold, silver, copper, lead, zinc)
1036-I Colorimetric determinations of traces of bismuth in rocks.
1037-A General geology and phosphate deposits of Concepcion del Oro district, Zacatecas, Mexico. (Copper, lead, zinc)
1042-A Geology of the Johnson Creek quadrangle, Caribou County, Idaho. (Vanadium)
1042-C Geology of the Virginia City quadrangle, Nevada. (Mercury, tungsten, antimony)
1046-B Rare-earth-bearing apatite at Mineville, Essex County, New York.
1330-C Water requirements of the aluminum industry. (Water Supply Paper)

Published Geologic Quadrangle Maps

Map GQ-89 Medford, Oregon-California. (Gold, chromite, tungsten, manganese, mercury)

Published Mineral Investigations Field Studies Maps

Map MF-49 Preliminary geologic map of the Aldrich Mountain quadrangle, Oregon. (Chromite)
Map MF-50 Preliminary geologic map of the Mt. Vernon quadrangle, Oregon. (Chromite)
Map MF-51 Preliminary geologic map of the John Day quadrangle, Oregon. (Chromite)
Map MF-54 Uranium and vanadium deposits of the Colorado Plateau that produced more than 1,000 tons of ore through June 30, 1955.
Map MF-97 Geology of the Bakersville-Plumtree area, Spruce Pine district, North Carolina. (Mica)

Maps and Reports placed on open file for public inspection

Preliminary report on the geology and deposits of monazite, thorite, and niobium-bearing rutile of the Mineral Hill district, Lemhi County, Idaho.
Relationships of calcium carbonate to lithology and vanadium-uranium deposits in the Salt Wash sandstone of southwestern Colorado.
Preliminary structure contour map and sections of part of the Metaline district, Pend Oreille County, Washington. (Zinc, lead)
Memoranda reports on geologic spot examinations of mines and prospects in Iran, February 1954 through June 1955. (Chromite, cobalt, copper, lead, zinc, antimony, manganese)
Fluorspar reserves of the United States.

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